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Underwater Data Acquisition And Marine Boundary Indication System For Fishermen

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Abstract: Security and safety is the major area where many innovations are found to be developing in our life. Every nation wants to protect its border and its people. In order to achieve this, every country is taking serious steps. Protecting the coastal area is found to be more difficult than land area. The disaster identification system of the coastal region is also found to be costlier. In order to overcome this we are proposing a new idea of underwater data acquisition and marine boundary indication system to protect the sea border easily. Our proposal also includes the prototype to protect the fishermen. This system also includes sensing devices which senses the motion of the sea each and every second, the sensed information are processed through controllers and it will be send to the seashore. An underwater transmitter is used which transmit its signal continuously over a range of 500 -1000 m. Receiver is placed in the boat of the fishermen. Whenever receiver receives a signal it will indicate the fishermen that they are closer to the boundary. Thus protecting coastal border will be made easier by using this at a low cost.

Keywords—Ocean Sensors; marine boundaries; underwater data acquistion; coastal boundary protectin; ocean currents.

I. INTRODUCTION

The Tamil Nadu coast line is 1076 km long – in the eastern coast it has 1016 km and in the western coast it has 60 kms. It is a daunting task to provide complete protection for this entire stretch. The insufficient security measure exposes the Indian soil to lurking dangers. In the present scenario Tamil Nadu fishermen are suffering a lot because of being unaware of the coastal border. Without their knowledge they are crossing the boundary. These violations of borders have resulted in shooting down of Indian fishermen, deprivation of their catches and nets plundering of their modern fishing equipments etc. Using radar technology we can prevent this, but a normal fisherman cannot buy these kind of costly equipment. GPS technology is also found to be expensive. The technologies being used by coastal security and fishermen at present to prevent from calamity, check their current location and navigate their boats are

A. Distress Alert Transmitters (DAT)
B. Vessel Traffic Management System (VTMS)
C. Ship Security Alert Systems (SSAS)
D. Automatic Identification System (AIS)

But all these technologies are expensive leaving the fishermen insufficiently equipped. The proposed idea can be an alternative without the use of satellite technology and cost effective method for supporting the fishermen. In addition it can also furnish information about nature of the ocean, tides and underwater life. In order to help them with a low cost security device we are proposing this idea.

II. SYSTEM DESIGN

A. Sensors

This system includes many sensors like *vibration sensor, temperature sensor, motion sensor etc.* these sensors helps in getting the data from the ocean. Each sensor produces analog signals which are very feeble these signals are amplified using operational amplifiers.

B. Analog to digital converter:

This block receives all the analog signals from the sensors which provide vital data of the ocean and sends it to the processor. We can use an ADS42JB69 from Texas Instruments.

C. Microprocessor :

The microprocessor receives all the signals from the analog to digital convertor and sends the data to the shore by fiber optic lines this processor also sends the signals to the transmitter periodically for the fishermen which alerts them about the end of boundary.

D. Power supply unit:

The power supply unit here produces the energy required to drive the components with the help kinetic movement of the sea. The kinetic movement of the sea is used to produce the electricity just like the wrist watch produces the energy to drive the watch just with the help of movement of the hands.

E. Transmitter & Reciver :

- Transmitter can be a RF transmitter or Zigbee this transmits the signals to the fishermen at the water surface.
- Receiver receives the RFID from the fishermen if the received signal doesn't match the id then it sends alerts to the coast guard and the sea shore.

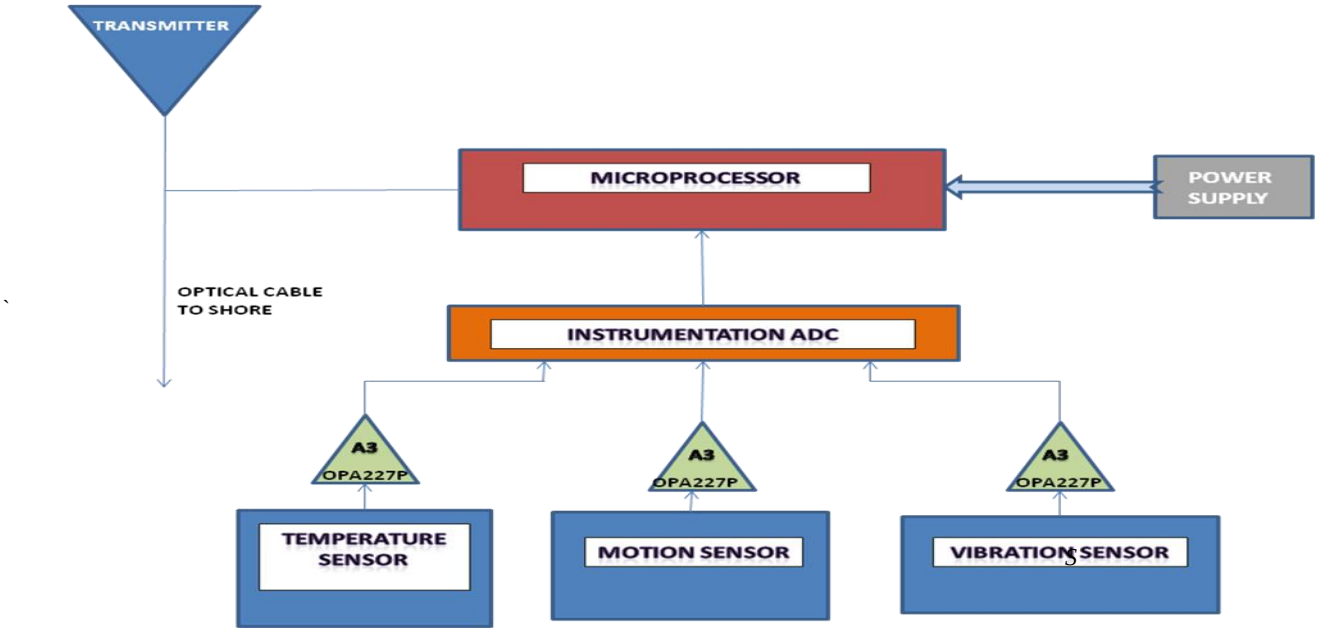

Figure 1. Shows the layout of the block of the unit, the whole system design is explained with the help of this figure.

III. WORKING

This unit is installed under water with the help of concrete and cables, the sensors first gets the data of the ocean and sends those signal to the analog to digital converter and then it sends those data to the processor and it further sends to the fishermen's receiver through transmitter about the marine boundary information. The unit gets power from the movement of the ocean water by means of currents. The temperature sensors gets the temperature of the ocean, motion sensor helps in finding the direction of the ocean currents and the vibration sensor helps in finding the seismic movements inside ocean thereby tsunami alerts can be given to the shore through the fibre cables.

IV. PROPOSED MODEL

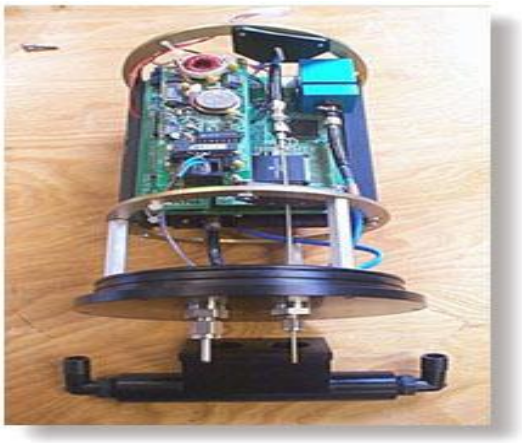

Figure 2. Shows the layout of aquatic node unit with sensors and processors (source: google images)

The above two figures shows the prototype model of the aquatic node, our proposed system is the slight variation of the above Google images here in the second image there will be a floating balloon attached to it this will make the node float it is firmly attached to sea bed with the help of alloy ropes which do not rust and they are firmly held by the concrete.

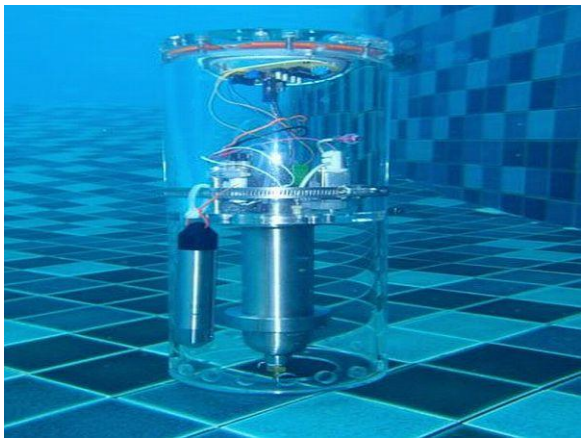

Figure 3. Shows the system which is kept in a water proof container and it is submerged underwater (source: Google images)

V. ADVANTAGE AND DISADVANTAGE

A. *Advantages:*

- The system is cost effective and gives security alerts on reaching the boundary lines thus warning the fishermen.

- It is an autonomous system that doesn't need any external supply, thus making it self sufficient.
- It can not only be used for security measures but also for providing information about the ocean currents, sea life and tides.
- With the collected information from the sensors government can take necessary steps to improve the sea life.
- It immediately transmits the information to the shore.
- It can be used for defense purposes, disaster management and as warning system for tsunami also.

B. Disadvantages:

Implementation of the system is tough. During natural calamities there might be damage of components, they have a threat being destructed by other country navy.

VI. CONCLUSION

The Indian subcontinent has a vast coastline and the same dangers persist on all the sides. This idea can be implemented in the entire coastal region which will thereby assist the fishermen. The multi-purpose device will be of great value. The simplicity of design, reproducibility and cost effectiveness of the system are the major positives of the device. The system on being successful has a wide scope of being implemented throughout the world.

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